RED SEAL

THE INTERPROVINCIAL STANDARDS RED SEAL PROGRAM

National Occupational Analysis

2013 | Powerline Technician

Human Resources and Skills Development Canada
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Canada

Occupational Analyses Series

Powerline Technician

2013

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FOREWORD

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this National Occupational Analysis (NOA) as the national standard for the occupation of Powerline Technician.

Background

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to cooperate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. To this end, Human Resources and Skills Development Canada (HRSDC) sponsors a program, under the guidance of the CCDA, to develop a series of NOAs.

The NOAs have the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Red Seal Examinations and curricula for training leading to the certification of skilled workers;
- to facilitate the mobility of apprentices and skilled workers in Canada; and,
- to supply employers, employees, associations, industries, training institutions and governments with analyses of occupations.

ACKNOWLEDGEMENTS

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This analysis was prepared by the Labour Market Integration Directorate of HRSDC. The coordinating, facilitating and processing of this analysis were undertaken by employees of the NOA development team of the Trades and Apprenticeship Division. The host jurisdiction of Alberta also participated in the development of this NOA.

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STRUCTURE OF ANALYSIS

To facilitate understanding of the occupation, the work performed by tradespersons is divided into the following categories:

Blocks	largest division within the analysis that is comprised of a distinct set of trade activities
Tasks	distinct actions that describe the activities within a block
Sub-Tasks	distinct actions that describe the activities within a task
Key Competencies	activities that a person should be able to do in order to be called 'competent' in the trade

The analysis also provides the following information:

Trends	changes identified that impact or will impact the trade including work practices, technological advances, and new materials and equipment
Related Components	list of products, items, materials and other elements relevant to the block
Tools and Equipment	categories of tools and equipment used to perform all tasks in the block; these tools and equipment are listed in Appendix A
Context	information to clarify the intent and meaning of tasks
Required Knowledge	elements of knowledge that an individual must acquire to adequately perform a task

The appendices located at the end of the analysis are described as follows:

Appendix A — Tools and Equipment	non-exhaustive list of tools and equipment used in this trade
Appendix B — Glossary	definitions or explanations of selected technical terms used in the analysis
Appendix C — Acronyms	list of acronyms used in the analysis with their full name
Appendix D — Block and Task Weighting	block and task percentages submitted by each jurisdiction, and the national averages of these percentages; these national averages determine the number of questions for each block and task in the Interprovincial exam
Appendix E — Pie Chart	graph which depicts the national percentages of exam questions assigned to blocks
Appendix F — Task Profile Chart	chart which outlines graphically the blocks, tasks and sub-tasks of this analysis

DEVELOPMENT AND VALIDATION OF ANALYSIS

Development of Analysis

A draft analysis is developed by a committee of industry experts in the field led by a team of facilitators from Human Resources and Skills Development Canada. This draft analysis breaks down all the tasks performed in the occupation and describes the knowledge and abilities required for a tradesperson to demonstrate competence in the trade.

Draft Review

The NOA development team then forwards a copy of the analysis and its translation to provincial and territorial authorities for a review of its content and structure. Their recommendations are assessed and incorporated into the analysis.

Validation and Weighting

The analysis is sent to all provinces and territories for validation and weighting. Participating jurisdictions consult with industry to validate and weight the document, examining the blocks, tasks and sub-tasks of the analysis as follows:

BLOCKS	Each jurisdiction assigns a percentage of questions to each block for an examination that would cover the entire trade.
TASKS	Each jurisdiction assigns a percentage of exam questions to each task within a block.
SUB-TASKS	Each jurisdiction indicates, with a YES or NO, whether or not each sub-task is performed by skilled workers within the occupation in its jurisdiction.

The results of this exercise are submitted to the NOA development team who then analyzes the data and incorporates it into the document. The NOA provides the individual jurisdictional validation results as well as the national averages of all responses. The national averages for block and task weighting guide the Interprovincial Red Seal Examination plan for the trade.

This method for the validation of the NOA also identifies common core sub-tasks across Canada for the occupation. If at least 70% of the responding jurisdictions perform a sub-task, it shall be considered common core. Interprovincial Red Seal Examinations are based on the common core sub-tasks identified through this validation process.

Definitions for Validation and Weighting

YES	sub-task performed by qualified workers in the occupation in a specific jurisdiction
NO	sub-task not performed by qualified workers in the occupation in a specific jurisdiction
NV	analysis Not Validated by a province/territory
ND	trade Not Designated in a province/territory
NOT COMMON CORE (NCC)	sub-task, task or block performed by less than 70% of responding jurisdictions; these will not be tested by the Interprovincial Red Seal Examination for the trade
NATIONAL AVERAGE %	average percentage of questions assigned to each block and task in Interprovincial Red Seal Examination for the trade

Provincial/Territorial Abbreviations

NL	Newfoundland and Labrador
NS	Nova Scotia
PE	Prince Edward Island
NB	New Brunswick
QC	Quebec
ON	Ontario
MB	Manitoba
SK	Saskatchewan
AB	Alberta
BC	British Columbia
NT	Northwest Territories
YT	Yukon Territory
NU	Nunavut

ANALYSIS

Safe working procedures and conditions, accident prevention, and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers and employees. It is imperative that all parties become aware of circumstances that may lead to injury or harm. Safe learning experiences and work environments can be created by controlling the variables and behaviours that may contribute to accidents or injury.

It is generally recognized that safety-conscious attitudes and work practices contribute to a healthy, safe and accident-free work environment.

It is imperative to apply and be familiar with the Occupational Health and Safety (OH&S) Acts and Workplace Hazardous Materials Information System (WHMIS) regulations. As well, it is essential to determine workplace hazards and take measures to protect oneself, co-workers, the public and the environment.

Safety education is an integral part of training in all jurisdictions. As safety is an imperative part of all trades, it is assumed and therefore it is not included as a qualifier of any activities. However, the technical safety tasks and sub-tasks specific to the trade are included in this analysis.

SCOPE OF THE POWERLINE TECHNICIAN TRADE

"Powerline Technician" is this trade's official Red Seal occupational title approved by the CCDA. This analysis covers tasks performed by powerline technicians whose occupational title has been identified by some provinces and territories of Canada under the following names:

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
Powerline Electrician													✓
Powerline Technician		✓	✓	✓		✓		✓	✓	✓	✓	✓	
Powerline Technician (Operating)	✓												

Powerline technicians construct, operate, maintain and repair overhead and underground electrical transmission and distribution systems. They erect and maintain steel, wood, fibreglass, laminate and concrete poles, structures and other related hardware. They install, maintain and repair overhead and underground powerlines and cables, and other associated equipment such as insulators, conductors, lightning arrestors, switches, metering systems, transformers and lighting systems. They splice and terminate conductors and related wiring to connect power distribution and transmission networks. In some jurisdictions, powerline technicians may also install underwater cables and install/transfer communication cables.

Powerline technicians are employed by electric power generation, transmission or distribution companies, electrical contractors and public utility commissions. In larger utilities, powerline technicians may also specialize in one of the following areas: transmission lines, overhead or underground distribution systems, communication networks and electrical power stations.

Powerline technicians require good communication skills to coordinate and facilitate work with customers, co-workers and other trades. They also require strong analytical skills in order to read and interpret diagrams, drawings and specifications. They must have good mechanical aptitude to install, troubleshoot and repair equipment. They must also have good vision and the ability to distinguish colours. The ability to adapt to change and a willingness to keep up with new developments is important to this trade.

Powerline technicians work outdoors at various worksites, at any hour and in any weather. The work always involves travel to and from the worksite, which is often in remote areas, necessitating the use of a variety of access equipment such as all-terrain vehicles, snowmobiles, aircrafts and watercrafts. Occupational hazards in this trade are working with high voltage equipment, working in confined spaces and working at heights. The work may be strenuous and requires frequent heavy lifting, working in awkward positions, carrying and reaching. Getting to powerlines requires climbing poles and structures, working from a bucket attached to an aerial lift boom and entering maintenance holes and underground vaults. Other inherent occupational hazards in this trade are electrical shocks, working in confined spaces and falling.

This analysis recognizes similarities or overlaps with the work of construction electricians and industrial electricians. Powerline technicians work with a wide variety of tradespersons, engineers and inspectors.

With experience, powerline technicians may act as mentors and trainers to apprentices in the trade. They may advance to senior journeyperson, foreperson, supervisory or managerial positions. They can also transfer their skills to related occupations in areas such as design, planning, safety, technical support services and system control.

OCCUPATIONAL OBSERVATIONS

Advancements in household technology and other energy demands such as upgrading and repairing aging infrastructure have increased the demand for the supply of electricity.

There is an increased trend, especially in urban centres, where new systems are being installed underground even though underground cables have a shorter lifespan than overhead wires. Some of the reasons for this trend are the reduced risk to the public, increased aesthetic appeal, and enhanced reliability in inclement weather. There is also a trend towards replacing old overhead systems with underground systems. In some jurisdictions, utility service providers are implementing cable rejuvenation procedures such as cable injection to prolong cable life.

There is a trend towards the use of longer-life structures and components because of factors such as climate change, larger loads and maintenance costs. For example, the use of composite poles such as fibreglass laminates is increasing.

Many of the components that powerline technicians work with are now environmentally friendly. These include, but are not limited to, pole preservatives, insulating oils and gases and stainless steel transformers. Utility service providers are moving towards more energy efficient equipment and vehicles to decrease their environmental footprint.

Utility service providers are investing in digital technology to increase service reliability and efficiency. These smart distribution systems are therefore becoming the norm across the country. Smart meters, automated reclosers and digital motor operating switches are examples of such technology. Computers, Global Positioning System (GPS) and Geographical Information System (GIS) are being installed in service vehicles for instant access to job-related information resource.

ESSENTIAL SKILLS SUMMARY

Essential skills are needed for work, learning and life. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of CCDA-endorsed tools have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:

- understand how essential skills are used in the trades;
- learn about individual essential skills strengths and areas for improvement; and
- improve essential skills and increase success in an apprenticeship program.

The tools are available online or for order at: www.hrsdc.gc.ca/essentialskills.

The essential skills profile for the powerline technician trade indicates that the most important essential skills are **reading texts, oral communication** and **critical thinking**.

The application of these skills may be described throughout this document within the competency statements which support each subtask of the trade. The following are summaries of the requirements in each of the essential skills, taken from the essential skills profile. A link to the complete essential skills profile can be found at www.red-seal.ca.

Reading
Powerline technicians read short notes on drawings and forms that contain technical information related to construction standards or specifications. They read emails and other correspondence from manufacturers or electrical grid personnel to stay informed on issues. They consult textbooks to determine steps to take when encountering new or infrequent tasks. They also consult summaries of the *Highway Traffic Act* to prepare for work on public roads. Powerline technicians also read a variety of code books, standards and regulations to ensure work is done in compliance with industry standards.

Document Use
Powerline technicians read information on lists, logbooks and timesheets, and they scan work orders for information about current projects such as job location, job description, timelines, scheduling, contractor requirements, project hazards and project contacts. They use area maps and equipment identification codes to identify their work location. They complete forms to track the disposal of hazardous materials. They interpret symbols and codes on construction drawings, and use schematic drawings to assemble a piece of equipment or to isolate a circuit.

Powerline technicians use information taken from tables and charts to perform calculations such as voltage drop or appropriate conductor sag.

Writing
Powerline technicians keep a daily logbook containing reminders and notes about job progress, deliveries, weather conditions and unusual occurrences. They may prepare training evaluations, switching authorizations and work protection documents. They document safety hazards and precautions or measures taken to mitigate potential hazards.

Numeracy
Powerline technicians estimate time and verify or determine materials and equipment required for a job. They calculate to what depth to bury poles, the weight of a load to be rigged, fuse size, the tension and angle of guy wires, and the average kilowatt demand for a building. Powerline technicians work in both metric and imperial systems of measurement and must be able to convert between the two systems.

Oral Communication
Powerline technicians communicate with dispatchers to exchange information about work in progress or to obtain new assignments, and with supervisors and other crew members several times a day to share crucial information about tasks that need to be completed and unforeseen problems. They maintain constant contact with all crew members during operations to ensure safety of all workers. Powerline technicians interact with property owners, the general public and various contractors. They also explain and demonstrate safe working techniques to new employees.

Thinking Skills
Powerline technicians use problem solving skills to determine how to proceed with an installation when safety hazards or unforeseen obstructions present themselves. They identify the people such as fire fighters, police, city representatives, tenants and dispatchers, who need to be consulted to determine course of action when faced with emergencies such as downed wires or traffic lights, and storms.

Powerline technicians use decision making skills to decide alternate work activities to be completed when weather prevents outside work. They decide on the suitability of materials and proper procedures to follow to accomplish tasks in a safe and efficient manner. Powerline technicians establish critical timelines for assigned projects keeping in mind that electrical power must be restored as quickly as possible.

Working with Others
Powerline technicians work as part of a crew to perform critical and often highly hazardous work; therefore, collaboration is crucial. They participate in formal and informal discussions with co-workers and supervisors about work processes. They monitor the work of others and may assign tasks to them or inform them how to perform a task.

Computer Use

Powerline technicians use communications software such as email to communicate with supervisors. They may access the Internet to obtain information, or to review electrical schematics or construction drawings. They also use other computer applications such as GIS software to locate or place powerline devices or components.

Continuous Learning

Powerline technicians need to maintain and upgrade their skills and knowledge of industry standards and regulations by attending educational sessions or courses offered by provincial or federal associations. Powerline technicians must also maintain their safety certifications such as cardiopulmonary resuscitation (CPR) and First Aid. They also learn from experienced co-workers.

BLOCK A — COMMON OCCUPATIONAL SKILLS

Trends

Communication within the trade is crucial. Evolutions in technology, such as mobile information systems and GPS, allow all parties to keep in touch, helping to improve safety, responsiveness in emergencies, and effectiveness in following work procedures.

There is an increase in safety and environmental regulations across jurisdictions, which requires more preparation time and training for powerline technicians. Safety concerns have also led to an increase in the use of aerial work platforms.

Related Components

All components apply.

Tools and Equipment

See Appendix A.

Task 1 — Uses and maintains tools and equipment.

Context

Powerline technicians must use and maintain tools and equipment in order to safely and effectively perform the duties of their trade.

Required Knowledge

K 1	types of hand tools and power tools
K 2	fueling and maintenance requirements
K 3	types of powder-actuated tools and shells
K 4	Transportation of Dangerous Goods (TDG) regulations
K 5	training and certification requirements for powder-actuated tools such as for implosive sleeves and dead-end bodies
K 6	types of electrical measuring and testing equipment
K 7	equipment testing requirements and schedules
K 8	jurisdictional and company policies
K 9	types of PPE such as hard hats, safety boots, safety glasses, hearing protection and flame retardant clothing (FRC)
K 10	safety equipment such as fire extinguishers, first aid kits, fall arrest, and rescue and escape equipment

K 11	types of rigging equipment such as slings, wire/conductor grips, shackles, ropes and cables
K 12	types of hoisting and lifting equipment such as chain hoists, rope blocks, cable winches, and collapsible capstan hoists
K 13	rigging procedures
K 14	components used for rigging, hoisting and lifting
K 15	sling angles
K 16	knot and splicing techniques
K 17	first aid and endorsements
K 18	hand signals

Sub-task

A-1.01 Maintains hand, power and powder-actuated tools and equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-1.01.01	clean and store tools and equipment according to manufacturers' specifications and company policies
A-1.01.02	recognize worn, damaged or defective tools and equipment, and repair, replace or remove them from service
A-1.01.03	store shells for powder-actuated tools according to jurisdictional regulations and WHMIS
A-1.01.04	sharpen hand tools such as knives and bits
A-1.01.05	lubricate and adjust tools and equipment
A-1.01.06	assemble and disassemble tools and equipment for cleaning or repair

Sub-task

A-1.02 Maintains electrical measuring and testing equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-1.02.01	recognize worn, damaged, expired or defective electrical measuring and testing equipment, and remove from service
A-1.02.02	replace electrical measuring and testing equipment components such as batteries and leads
A-1.02.03	store electrical measuring and testing equipment according to manufacturers' specifications

Sub-task

A-1.03 Uses rigging, hoisting and lifting equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-1.03.01	select rigging equipment such as slings, wire/conductor grips, shackles, ropes and cables according to task
A-1.03.02	select hoisting and lifting equipment such as chain hoists, rope blocks, cable winches and collapsible capstan hoists according to task
A-1.03.03	calculate weight of load using load charts and name plates
A-1.03.04	measure weight of load and sag conductors using a dynamometer
A-1.03.05	rig load according to job task to facilitate the hoisting of equipment
A-1.03.06	splice ropes and tie knots to assist in rigging
A-1.03.07	hoist load considering factors such as weight of load, travel path and weather conditions
A-1.03.08	store rigging, hoisting and lifting equipment according to manufacturers' specifications
A-1.03.09	identify damaged, worn or otherwise unsafe rigging, hoisting and lifting equipment, and remove from service
A-1.03.10	clean and lubricate rigging, hoisting and lifting equipment

Sub-task

A-1.04 Uses personal protective equipment (PPE) and safety equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-1.04.01	select PPE such as hard hats, rubber gloves, safety boots, safety glasses, face shields, hearing protection, and FRC and arc flash clothing according to weather conditions, job task and fault level
A-1.04.02	select safety equipment such as fire extinguishers, first aid kits and rescue equipment
A-1.04.03	verify and adjust fit of PPE
A-1.04.04	operate safety equipment according to manufacturers' specifications, safety regulations and work methods
A-1.04.05	clean and store PPE and safety equipment in designated area
A-1.04.06	remove defective, expired, damaged or worn PPE and safety equipment from service

Task 2 Accesses work area.

Context Powerline technicians access work areas by climbing poles and structures, using access equipment, and on- and off-road equipment. They may be flown in helicopters to access structures in remote areas.

Required Knowledge

K 1	safe climbing procedures such as using fall arrest and fall restraint devices
K 2	operating license requirements
K 3	rescue procedures such as pole top, tower, confined space, bucket rescue and bucket escape
K 4	limits of approach
K 5	first aid and endorsements
K 6	environmental regulations
K 7	types and uses of climbing gear
K 8	manufacturers' specifications on care and use of climbing gear

K 9	types of on- and off-road equipment such as bucket trucks, radial boom derricks (RBD) and off-road track machines
K 10	rescue equipment such as bucket rescue and confined space rescue
K 11	types of access equipment such as fibreglass ladders, scaffolding and rope ladders
K 12	maintenance requirements of on- and off-road equipment

Sub-task

A-2.01 Climbs poles and structures.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-2.01.01	select and inspect climbing gear such as belts, spurs and fall arrest required for task
A-2.01.02	inspect pole and structure to ensure safety and stability by performing visual checks and integrity tests
A-2.01.03	position and adjust climbing gear according to type and size of pole and structure, and individual fit
A-2.01.04	use climbing techniques according to job and weather

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Sub-task

A-2.02 Uses access equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-2.02.01	follow access equipment rules such as 3-point contact and ladder ratios
A-2.02.02	use rescue systems for retrieval, descent and lateral transfers
A-2.02.03	identify and adapt to work situations such as slippery ground and inclement weather
A-2.02.04	use insulated work platform to access work position on structures according to manufacturers' specifications

A-2.02.05	use confined space monitoring equipment according to jurisdictional regulations
A-2.02.06	inspect, maintain, assemble and store access equipment according to manufacturers' specifications

Sub-task

A-2.03 Uses on- and off-road vehicles and equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-2.03.01	follow jurisdictional safety techniques for helicopter access and all-terrain vehicles such as quads, side by sides, boats and snowmobiles
A-2.03.02	select and operate equipment according to job requirements based on manufacturers' specifications such as load chart information and working load limits (WLL)
A-2.03.03	level on- and off-road equipment using methods such as digging and blocking
A-2.03.04	extend outriggers to ensure stability
A-2.03.05	inspect on- and off-road equipment to ensure safe operation

Task 3 Organizes work.

Context Powerline technicians need to organize their work by using documentation, work protection codes and regulations, and by planning their daily tasks before starting a job. These tasks are important for safety and productivity.

Required Knowledge

K 1	quality assurance standards
K 2	types of drawings such as architectural, mechanical and electrical
K 3	mapping symbols, codes and legends
K 4	jurisdictional regulations and company standards
K 5	overhead and underground utilities and related hazards

K 6	substations and related hazards
K 7	secondary and primary clearances
K 8	easements and boundary lines
K 9	environmental regulations
K 10	sequence of work
K 11	need for other workgroups on site
K 12	qualification requirements of personnel

Sub-task

A-3.01 **Interprets codes, regulations and procedures.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-3.01.01	access information such as safe work procedures, installation procedures and construction standards in company policies and standards
A-3.01.02	access information in jurisdictional regulations and standards such as WHMIS, traffic control, environmental and TDG

Sub-task

A-3.02 **Interprets plans, drawings and specifications.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-3.02.01	locate relevant information in specifications, standards and amendments
A-3.02.02	analyze plans, drawings and specifications
A-3.02.03	verify materials required for job

Sub-task

A-3.03 Prepares worksite.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-3.03.01	determine location of overhead and underground services such as gas, communication and electrical
A-3.03.02	identify and remove or mitigate obstacles, hazards and barriers such as snow, trees and boulders
A-3.03.03	organize and handle material and supplies

Sub-task

A-3.04 Plans job tasks and procedures.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-3.04.01	adapt work to weather conditions following safety parameters when performing live-line work
A-3.04.02	determine impact to customers/public such as outages, traffic control and property
A-3.04.03	estimate time to complete specific tasks in order to establish daily goals, taking into consideration the need for other trades/workers and their level of experience
A-3.04.04	identify line status to ensure work is done on correct circuit
A-3.04.05	arrange for materials and supplies required for job
A-3.04.06	obtain permits and authorizations for work such as live-line and de-energized

Task 4 — Establishes safe work environment.

Context

Powerline hazards are constantly present and each work scenario holds unique risks specific to the job being performed. These hazards may be electrical, gravitational, mechanical, vehicular, environmental or chemical. They present risks to the powerline technician, the public, the electrical system and equipment.

Environmental hazards are those which present a risk to the surrounding environment.

Required Knowledge

K 1	confined space regulations and procedures
K 2	grounding and bonding requirements
K 3	surrounding hazards and safety risks
K 4	protective equipment such as reclosers, cover-up, potential indicators and fuses
K 5	work protection procedures
K 6	limits of approach
K 7	principles of induction and backfeed
K 8	potential environmental hazards such as oil spills and damage to streams and wetlands
K 9	company policies and procedures pertinent to environmental protection such as notifying proper authority
K 10	switching procedures

Sub-task

A-4.01 Controls powerline hazards.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-4.01.01	recognize overhead work hazards such as foreign debris, broken poles, insulators, tie wires and crossarms
A-4.01.02	recognize underground work hazards such as gases, fumes, flooding and cave-ins

A-4.01.03	eliminate hazards by using methods such as de-energizing, grounding and removing backfeed potential
A-4.01.04	minimize hazards by using signage and protective barriers such as barricades, cover-up, rubber gloves and hot sticks according to limits of approach and live-line procedures
A-4.01.05	identify and eliminate second points of contact (step and touch potential) by installing protective barriers
A-4.01.06	ventilate confined or restricted spaces such as tunnels, trenches and manholes
A-4.01.07	select and use rescue and monitoring equipment for confined spaces
A-4.01.08	communicate hazard information to concerned parties such as co-workers, other work groups and the public

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Sub-task

A-4.02 Controls environmental hazards.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-4.02.01	identify potential environmental hazards such as oil spills, gas spills and fire conditions, and working in the vicinity of environmentally sensitive areas
A-4.02.02	clean oil spill by using spill kits and report according to location of spill and environmental regulations
A-4.02.03	minimize hazards by installing protective barriers such as silt screens and sand bags according to environmental hazards and regulations
A-4.02.04	report environmental hazards to emergency services to minimize or eliminate
A-4.02.05	adjust work procedures such as the use of tools and equipment according to potential environmental hazards

Sub-task

A-4.03 **Performs lock-out and tag-out procedures.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-4.03.01	coordinate lock-out and tagging requirements with appropriate authorities, other trades and work groups
A-4.03.02	identify circuit for lock-out and tagging, and recognize other equipment or abnormal conditions that may present a hazard
A-4.03.03	identify power source, and de-energize and lock-out equipment
A-4.03.04	tag equipment and apparatus such as elbows, jumpers and isolation points
A-4.03.05	test system for potential using equipment such as voltmeters and high voltage testers to verify proper lock-out and tagging
A-4.03.06	tag live-line equipment such as reclosers and station breakers
A-4.03.07	report and document lock-out and tag-out to system authority and other work groups

Task 5 Uses live-line methods.

Context Live-line work is done by powerline technicians so that electrical service is not interrupted. Proper work methods ensure safety and may vary by system authority and jurisdiction. Use of live-line bare-hand work procedures is a specialized area of powerline work.

Required Knowledge

K 1	regulations and limitations for use of cover-up, rubber gloves, bare hand methods and fibre reinforced plastic (FRP) tools (sticks)
K 2	types of cover-up such as hoses, hoods, blankets and rigid cover-up
K 3	classes and uses of cover-up
K 4	inspection requirements for cover-up and rubber gloves
K 5	circuit designation, voltage and amperage
K 6	tools and equipment used for rubber glove work
K 7	applications for use of rubber gloves and sleeves
K 8	proper positioning for rubber glove work

K 9	reasons for using non-conductive or conductive bucket liners
K 10	types of live-line jumpers and their current limitations
K 11	bare-hand methods
K 12	inspection and field testing of insulated aerial devices
K 13	bonding procedures
K 14	required protective equipment such as conductive suits and boots
K 15	procedures for FRP tool (stick) work
K 16	attachments for FRP tools (sticks) such as tie cutters, rotary blades, rotary prongs and cotter key installers
K 17	regulations and limitations of FRP tools (sticks)

Sub-task

A-5.01 Uses cover-up.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-5.01.01	select cover-up according to job specifications, circuit status and voltage
A-5.01.02	verify cover-up has valid test date or expiration date
A-5.01.03	perform visual inspections of cover-up for problems such as cuts and abrasions
A-5.01.04	install cover-up to isolate from second point of contact
A-5.01.05	maintain safe limits of approach from second point of contact according to company and industry standards
A-5.01.06	remove cover-up
A-5.01.07	maintain, clean and store cover-up

Sub-task

A-5.02 Uses rubber glove method.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-5.02.01	select class of rubber gloves according to voltage
A-5.02.02	verify rubber gloves have valid expiration dates
A-5.02.03	perform air and stretch test and visually inspect rubber gloves for cuts and abrasions
A-5.02.04	verify glove covers for class of rubber gloves
A-5.02.05	visually inspect glove covers for cuts and abrasions
A-5.02.06	position body and access equipment for safety and ease of task, according to limits of approach
A-5.02.07	verify non-conductive bucket liner is installed in properly rated access equipment for non-conductivity
A-5.02.08	perform leakage test using tools such as micro-ammeters to ensure work is done within safety standards

Sub-task

A-5.03 Uses bare-hand methods.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
no	yes	no	yes	ND	yes	yes	yes	yes	yes	no	NV	NV

Key Competencies

A-5.03.01	prepare and ground aerial device
A-5.03.02	perform leakage test using tools such as micro-ammeters to ensure work is done within safety standards
A-5.03.03	select and use tools and equipment such as hydraulic cutters, jumpers, bonding wands and bare-hand suits used for various bare-hand work
A-5.03.04	follow bare-hand techniques according to company's work methods
A-5.03.05	continuously observe current leakage monitor

Sub-task

A-5.04 Uses fibreglass reinforced plastic (FRP) tools (sticks).

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

A-5.04.01	select FRP tools (sticks) such as grip-alls, universal sticks and switch sticks
A-5.04.02	confirm FRP tools (sticks) are rated for voltage of task and have valid expiration dates
A-5.04.03	calculate weights and tensions for FRP tool (stick) selection
A-5.04.04	select attachments for FRP tools (sticks) such as tie cutters, rotary blades, rotary prongs and cotter key installers
A-5.04.05	clean and visually inspect FRP tools (sticks) for problems such as cracks and loose fittings before use
A-5.04.06	position body and access equipment for safety and ease of task, according to limits of approach
A-5.04.07	store FRP tools (sticks) according to manufacturers' specifications

Trends	Due to environmental issues and expected life of wood poles, materials used for structures and components now include fibreglass, concrete and steel. Hydro-vacuum excavation is increasingly being used in areas where there are many underground utilities present.
Related Components (including, but not limited to)	Poles and structures (wood, steel, aluminium, fibreglass, concrete, laminate), prefabricated bases, crossarms, insulators, guy wires, anchors, hardware, pole ground wire.
Tools and Equipment	See Appendix A.

Task 6 Installs poles.

Context Poles are installed to support overhead distribution and transmission power systems at a safe distance from the public. They are made from various materials such as wood, steel, concrete and fibreglass.

Required Knowledge

K 1	types of pole materials such as wood, concrete, steel, fibreglass and wood laminate
K 2	treated and non-treated poles
K 3	types of treatments such as chromated copper arsenates (CCA) and creosote oil
K 4	environmental regulations
K 5	location of pole stamps
K 6	framing standards and specifications
K 7	company standards
K 8	types of hardware such as crossarms and pole top pins
K 9	types of equipment such as switches and transformers
K 10	pole weight, class and length
K 11	types of soil conditions such as swampy and rocky
K 12	adjacent utilities such as gas, water and communication

K 13	hole diameter and setting depth
K 14	pole installation procedures such as rock mount and pole crib
K 15	temporary load control techniques (tag line) and procedures such as installation by helicopter, excavator and crane
K 16	techniques and procedures to set poles within energized lines
K 17	size of guy wires
K 18	types of anchors such as double helix and rock
K 19	length and size of anchor rods
K 20	strain insulators and fibre rods
K 21	pole gain (identification)

Sub-task

B-6.01 **Frames poles.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

B-6.01.01	check pole stamp information such as length, class, treatment type and pole type to ensure the pole meets job requirements
B-6.01.02	install ground wire on wood poles based on company standards and regulations to provide a path to ground for electrical surges
B-6.01.03	measure distances for placement of hardware and equipment based on company standards using tools such as folding rulers
B-6.01.04	drill holes straight and level at required spacing based on company standards
B-6.01.05	attach hardware and equipment such as guy hooks, pole top pins, crossarms, switches and transformers according to company standards

Sub-task

B-6.02 **Sets poles.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

B-6.02.01	dig hole to required depth according to industry standard using equipment such as digger derricks, hydro-vacuums, excavators and shovels
B-6.02.02	install pole setting devices such as pole cribbing and rock mounts according to soil condition
B-6.02.03	place pole in hole using equipment such as digger derricks and cranes
B-6.02.04	plumb pole, backfill and tamp hole

Sub-task

B-6.03 **Installs pole guys and anchors.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

B-6.03.01	install anchors such as helix anchors, rock anchors, cross plates and expansion anchors, according to soil conditions
B-6.03.02	install attachments, insulated breakers/rods and guy wires according to company standards
B-6.03.03	secure and tension guy wires using chain/cable hoists and grips
B-6.03.04	bond guy wires according to company standards

Task 7 — Installs steel structures.

Context

Steel structures are installed primarily to support overhead transmission powerlines. They are also used in some distribution and substation applications. These structures are preferred in order to accommodate increased clearances required by high operating voltage, weight of conductors and longer distances between the structures.

Installing steel structures is a specialized area of powerline work.

Required Knowledge

K 1	types of footings such as concrete and grillage
K 2	environmental regulations
K 3	template set-up procedures
K 4	adjacent utilities such as gas, water and communication
K 5	types of structures such as dead-end and tangent structures
K 6	assembly procedures and manufacturers' specifications
K 7	weight of components
K 8	site set-up for assembling steel structures
K 9	erection procedures
K 10	structure sections and structure weight
K 11	size and load rating of guy wires
K 12	types of anchors such as cross plates and multi-helix
K 13	types of soil conditions such as swampy and rocky

Sub-task

B-7.01 Installs footings. (NOT COMMON CORE)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	no	ND	yes	no	yes	yes	yes	no	NV	NV

Key Competencies

B-7.01.01	oversee assembly and placing of footings in ground according to engineering standards
B-7.01.02	install grounding systems such as counterpoise and bonds using techniques such as thermal welding and mechanical bonding

Sub-task

B-7.02 **Assembles steel structures.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	ND	yes	yes	yes	yes	yes	no	NV	NV

Key Competencies

B-7.02.01	lay out steel structure components verifying that all components are present
B-7.02.02	assemble components and hardware on the ground using lifting equipment as required according to manufacturers' specifications, roadway and rail protection and adjacent live-lines

Sub-task

B-7.03 **Erects steel structures.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	ND	yes	yes	yes	yes	yes	no	NV	NV

Key Competencies

B-7.03.01	place and secure base or structure on footing using equipment such as cranes or helicopters
B-7.03.02	connect remaining structure sections as required in sequence aloft using equipment such as cranes, helicopters or gin poles
B-7.03.03	use temporary guy wires depending on type of structure to ensure stability during erection
B-7.03.04	torque and ping bolts according to manufacturers' specifications

Sub-task

B-7.04 **Installs steel structure guy wires and anchors.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	ND	yes	yes	yes	yes	yes	no	NV	NV

Key Competencies

B-7.04.01	select anchor type according to soil condition
B-7.04.02	select guy wire size and guy attachments according to company standards
B-7.04.03	position and install anchors for structures such as dead-end or corner to add stability
B-7.04.04	install strain insulators and fibre rods to prevent a difference in potential
B-7.04.05	assemble, secure and tension guy wires using tools such as hoists, grips and dynamometers while ensuring the structure is plumb

Trends

There are new insulator materials for overhead systems with mechanical clamping to reduce loose tie wires. Pre-formed ties are increasingly being used because of their efficiency, their ease of use and for safety reasons related to live-line work.

New conductor materials such as strand seal and mastic seal on primary conductors have been introduced to prevent water penetration in underground systems.

Related Components (including, but not limited to)

Conductors, cable lubricants, terminations, splices, conduits, manholes, vaults, tags, insulators, armour rods, dampers, spacers, ties, clamps, aerial markers.

Tools and Equipment

See Appendix A.

Task 8 Installs overhead conductors.

Context

Overhead conductors are installed to deliver electricity from the generating station to customers. They are also used to interconnect utilities. Also includes communication lines such as fibre optic cable.

Overhead conductors are easier to access than underground conductors. There are various types of overhead conductors such as primary and secondary. Some are bare and others are insulated.

Required Knowledge

K 1	types and sizes of conductors such as aluminium conductor steel reinforced (ACSR), aluminium and copper
K 2	types and sizes of pulling equipment such as tensioning machines
K 3	stringing procedures such as conventional and tension
K 4	structure loading such as weight and tension
K 5	roadway protection and adjacent live-lines
K 6	grounding and bonding procedures
K 7	effect of sag on conductor tension
K 8	types and sizes of conductor clamps and ties

K 9	conductor weight
K 10	conductor components such as anti-vibration dampers, spacers and armour rods
K 11	types of insulators such as suspension, stack and pole top
K 12	types and sizes of sleeves such as compression and automatic
K 13	types of presses and sizes of dies
K 14	splicing and termination techniques

Sub-task

C-8.01 **Strings overhead conductors.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

C-8.01.01	install travelers on poles or insulators
C-8.01.02	temporarily run conductor/rope through travellers to reduce friction when sagging
C-8.01.03	attach pulling equipment to conductor/rope
C-8.01.04	set up and operate stringing equipment when using tension stringing method

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Sub-task

C-8.02 **Sags overhead conductors.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

C-8.02.01	adjust conductor tension based on information on sag charts to achieve even sag between spans using tools and equipment such as dynamometers, sag boards, pullers, transits and grips
C-8.02.02	secure conductors to dead-end fixtures depending on type and size of conductor

Sub-task

C-8.03 Ties-in overhead conductors.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

C-8.03.01	transfer conductor from travelers to insulators
C-8.03.02	install dampers, spacers, aerial markers and armour rods according to company standards
C-8.03.03	secure conductor using clamps or ties
C-8.03.04	remove travelers

Sub-task

C-8.04 Splices overhead conductors.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

C-8.04.01	select and apply sleeves such as automatic, compression and powder-actuated on ends of conductors to be spliced according to their type and size
C-8.04.02	complete connection by using compression tools and equipment such as hydraulic, battery-operated, powder-actuated and hand-operated compression tools
C-8.04.03	follow splicing techniques such as rotation or overlap according to manufacturers' instructions
C-8.04.04	use hoists to adjust sag when splicing under tension

Task 9 — Installs underground and underwater cable.

Context

Powerline technicians install underground cable for aesthetic, clearance and safety reasons. This type of installation is more expensive and requires special care when installing. If improperly installed, repair is more costly and time consuming which in turn affects customer service because of longer outages.

Required Knowledge

K 1	types of conduit systems and components
K 2	adjacent utilities such as gas, water, storm water and communication
K 3	drainage requirements
K 4	types of manholes and vaults
K 5	types and sizes of underground and underwater cable such as primary and secondary
K 6	pulling methods and calculations
K 7	installation specifications such as direct burial and duct system
K 8	types of splices such as cold shrink, heat shrink and tape
K 9	types of terminations such as stress cones and elbows
K 10	voltage and amperage
K 11	required permits for working in navigable waterways and confined spaces

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Sub-task

C-9.01 Installs conduit and cable installations.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

C-9.01.01	place conduits in trench according to company standards
C-9.01.02	install pulling ropes or tape to facilitate future cable installation
C-9.01.03	backfill trenches using materials such as concrete, sand and clean fill
C-9.01.04	tamp soil using compacting equipment
C-9.01.05	prepare conduit for cable installation for example cleaning and clearing conduit
C-9.01.06	apply cable lubricant to reduce friction when running cable through conduit

C-9.01.07	attach pulling connections such as swivels and kellem grips to the pulling rope
C-9.01.08	pull cable through conduit using equipment such as tension machines, winches and capstans

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Sub-task

C-9.02 Places underground and underwater cable.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	no	yes	NV	NV

Key Competencies

C-9.02.01	lay cable in trench or waterway following installation specifications
C-9.02.02	backfill trenches using materials such as concrete, sand and clean fill
C-9.02.03	tamp soil using compacting equipment
C-9.02.04	tag cable to identify phasing to prevent out-of-phase conditions

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Sub-task

C-9.03 Splices underground and underwater cable.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

C-9.03.01	prepare cable by following manufacturers' specifications and company standards
C-9.03.02	apply compression sleeves on ends of cables to be spliced according to their type and size
C-9.03.03	compress connection by using tools with proper dies, and equipment such as hydraulic, battery-operated and hand-operated compression tools
C-9.03.04	follow compression techniques such as rotation or overlap according to manufacturers' instructions
C-9.03.05	complete splice following manufacturers' specifications and company standards

Sub-task

C-9.04 Terminates underground and underwater cable.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

C-9.04.01	prepare cable for termination by following manufacturers' specifications and/or company standards
C-9.04.02	apply compression fittings on end of cable to be terminated according to their type and size
C-9.04.03	compress connection using tools with proper dies, and equipment such as hydraulic, battery-operated and hand-operated compression tools
C-9.04.04	follow compression techniques such as rotation or overlap according to manufacturers' instructions
C-9.04.05	install terminations such as elbows and stress cones on end of cable following manufacturers' specifications and company standards
C-9.04.06	test cable integrity and designation by using methods such as ultra-low frequency (ULF), very low frequency (VLF) and meggering
C-9.04.07	confirm cable designation using methods such as meggering

Trends

Light emitting diode (LED) street lights are being introduced into the market because of their extremely high efficiency rates.

Metering devices are changing from analog to digital format. Radio frequency meters and cellular chip meters are being installed to aid in reading meters.

Devices used for protection equipment are increasingly electronically controlled rather than manually controlled.

New technology in auxiliary equipment is creating much smaller components with greater fault interrupting capabilities.

Sulphur hexafluoride gas (SF_6) is being more frequently utilized in switching devices because of its smaller environmental footprint and lighter weight.

More and more, utilities are sharing infrastructure with communication companies. As a result, cellular antennas are being installed on electrical structures. Because of the proximity to energized conductors they can only be accessed and installed by qualified powerline technicians.

Related Components (including, but not limited to)

Lighting systems: photocells, ballasts, starters, lamps, capacitors, connectors, support arms, fixtures, relays, inline fuses.

Voltage control equipment: transformers, capacitors, switches, regulators, reactors, fuses.

Protection equipment: fused switches, sectionalizers, reclosers, lightning arrestors, bypass switches, ground rods, connectors.

Metering equipment: meters, test blocks, current transformers, potential transformers, wiring harnesses, meter seals, primary metering tanks, disconnect sleeves, meter socket covers.

Communication equipment: antennas, communication lines.

Tools and Equipment

See Appendix A.

Task 10 — Installs lighting systems.

Context This task explains the process of assembling, installing and maintaining lighting systems on structures.

Required Knowledge

K 1	types of fixtures such as LED, sodium vapour, mercury vapour and metal halide
K 2	types and functions of components such as starters, ballasts, capacitors and photocells
K 3	types of voltage systems such as 120 and 240
K 4	mounting arm materials such as galvanized steel and aluminium
K 5	types of control systems such as individual and cascade
K 6	troubleshooting and maintenance procedures

Sub-task

D-10.01 Installs street lights.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

D-10.01.01	select and use tools and equipment such as drills, aerial devices, compression tools and multi-meters
D-10.01.02	select light components and wiring according to job specifications such as voltage, wattage and type required
D-10.01.03	assemble fixture and mounting arm components such as lamps, bird stops and photocells according to manufacturers' specifications
D-10.01.04	fasten mounting arm to structure
D-10.01.05	mount and level fixture to direct light to desired location
D-10.01.06	connect fixture wiring to source
D-10.01.07	face photocell in direction away from other lighting sources to ensure operation
D-10.01.08	test operation of street light
D-10.01.09	set and secure street light bases such as break-away, concrete and screw-in

Sub-task

D-10.02 Maintains street lights.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

D-10.02.01	select and use tools and equipment such as aerial devices, compression tools and multi-meters
D-10.02.02	visually inspect street lights for problems such as loose connections, burnt wires and broken photocells
D-10.02.03	check source voltage using multi-meters
D-10.02.04	check for defective components such as defective starters, ballasts and capacitors using multi-meters
D-10.02.05	check for proper bulb according to type of fixture and manufacturers' specifications
D-10.02.06	repair, replace and dispose of damaged components such as defective starters and faulty ballasts according to manufacturers' specifications
D-10.02.07	test operation of street light

Task 11 Installs voltage control equipment.

Context

Powerline technicians install transformers, capacitors, regulators, switches and reactors in order to control or modify voltage, and to maintain the correct power factor. This ensures a reliable product for customers. For example, it helps to keep machinery running at a consistent pace and minimizes damage to sensitive electrical equipment.

Required Knowledge

K 1	types and sizes of transformers such as primary voltage, secondary voltage and kilovolt/amp (kVA) rating
K 2	regulators and transformers equipped with tap changers
K 3	single-phase and three-phase applications
K 4	delta and wye connections
K 5	hazards when installing transformers such as backfeed and paralleling

K 6	types, sizes and purposes of capacitors, regulators, reactors and transformers
K 7	installation and replacement procedures for capacitors, regulators, reactors and transformers according to utility standards
K 8	power factor calculations
K 9	locations that require installation of regulators
K 10	operating principles of capacitors, regulators, reactors and transformers
K 11	related equipment such as control panels, bypass switches and arrestors
K 12	types of switches such as inline, cut-out and gang operated
K 13	switch capacity such as amperage and voltage rating
K 14	load breaking capability of switches
K 15	switch components such as arc snuffers, blades and connectors

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Sub-task

D-11.01 Installs transformers.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies:

D-11.01.01	select and use tools and equipment such as drills, aerial devices and FRP tools (sticks)
D-11.01.02	select transformer required for application by interpreting name plate information
D-11.01.03	check internal connections and change according to required voltage
D-11.01.04	fasten aerial transformer to structure according to company standards and manufacturers' specifications
D-11.01.05	position and secure pad-mounted transformer and well or pad according to company standards and manufacturers' specifications
D-11.01.06	make wiring connections such as primary, secondary and grounding according to jurisdictional requirements
D-11.01.07	energize transformer and check voltage and phase rotation

Sub-task

D-11.02 Installs capacitors.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	no	NV	NV

Key Competencies

D-11.02.01	select and use tools and equipment such as drills, aerial devices and FRP tools (sticks)
D-11.02.02	verify selection of capacitor according to company standards such as rating and voltage required
D-11.02.03	control capacitive charge when installing and removing capacitors by shorting out capacitor bushings
D-11.02.04	mount/place and connect capacitors on structure according to company standards and manufacturers' specifications
D-11.02.05	perform tests according to company standards
D-11.02.06	energize and de-energize capacitors

Sub-task

D-11.03 Installs voltage regulators.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

D-11.03.01	select and use tools and equipment such as RBD, drills, compression tools and FRP tools (sticks)
D-11.03.02	verify selection of regulator according to rating and voltage required
D-11.03.03	place and secure regulator according to company standards and manufacturers' specifications
D-11.03.04	connect regulator according to company standards
D-11.03.05	operate regulator to test functionality
D-11.03.06	commission or decommission regulators according to safe work procedures and company standards

Sub-task

D-11.04 Installs switches.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

D-11.04.01	select and use tools and equipment such as drills, compression tools and FRP tools (sticks)
D-11.04.02	select switch according to company standards and manufacturers' specifications for sectionalizing line, and isolating and protecting equipment
D-11.04.03	place and secure switch in specified location according to company standards and type of switch
D-11.04.04	make switch operational by making connections and removing line between connections
D-11.04.05	bypass and adjust switch according to manufacturers' specifications
D-11.04.06	verify that switches work in conjunction with each other where required

Sub-task

D-11.05 Installs reactors. (NOT COMMON CORE)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
no	no	no	yes	ND	yes	no	yes	no	no	no	NV	NV

Key Competencies

D-11.05.01	select and use tools and equipment such as drills, compression tools and FRP tools (sticks)
D-11.05.02	verify selection of reactor according to company standards such as rating and voltage required
D-11.05.03	place and secure reactor in specified location according to company standards and manufacturers' specifications
D-11.05.04	de-energize source before installation
D-11.05.05	make reactor operational by making connections and energizing
D-11.05.06	perform tests according to company standards

Task 12 — Installs protection equipment.

Context Powerline technicians install reclosers, fuses and sectionalizers to protect line equipment. Lightning arrestors are used to dissipate lightning.

Required Knowledge

K 1	types of reclosers such as hydraulic and electronic
K 2	time curves and amperage rating for proper fuse coordination
K 3	suitable locations for reclosers
K 4	purposes of reclosers
K 5	types and sizes of sectionalizers
K 6	purposes of sectionalizers such as acting as a non-reclose protector and as an isolation device
K 7	operating handle
K 8	installation and replacement procedures
K 9	fuse ratings such as type and amperage rating
K 10	variety of fuses such as current limiting and power
K 11	fuse coordination
K 12	fuse charts
K 13	voltage rating of lightning arrestors
K 14	types of arrestors such as station and intermediate
K 15	applications of arrestors such as distribution, station and transmission
K 16	required locations for arrestors
K 17	types of breakers such as SF6 gas

Sub-task

D-12.01 Installs reclosers.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

D-12.01.01	select and use tools and equipment such as drills, aerial devices and FRP tools (sticks)
D-12.01.02	select recloser according to company standards

D-12.01.03	place and secure recloser to structure according company standards and manufacturers' specifications
D-12.01.04	connect recloser to circuit to be protected
D-12.01.05	energize recloser
D-12.01.06	perform tests according to company standards

Sub-task

D-12.02 Installs sectionalizers.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

D-12.02.01	select and use tools and equipment such as drills, aerial devices and FRP tools (sticks)
D-12.02.02	select sectionalizer according to company standards
D-12.02.03	place and secure sectionalizer to structure according to company standards and manufacturers' specifications
D-12.02.04	connect sectionalizer to circuit to be protected
D-12.02.05	energize sectionalizer
D-12.02.06	perform tests according to company standards

Sub-task

D-12.03 Installs fuses.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

D-12.03.01	select and use tools and equipment such as wrenches, pliers, multi-meters, fuse charts and FRP tools (sticks)
D-12.03.02	select fuse according to company standards based on amperage, rating, type of switch, fuse coordination and application
D-12.03.03	visually check switch for defects such as cracks and component misalignment
D-12.03.04	place fuse into holder according to manufacturers' specifications

D-12.03.05	place fuse holder into switch according to manufacturers' specifications, and close holder
D-12.03.06	identify defective fuse through visual inspection or use of multi-meter continuity test

Sub-task

D-12.04 Installs lightning arrestors.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

D-12.04.01	select and use tools and equipment such as wrenches, pliers and FRP tools (sticks)
D-12.04.02	select lightning arrestor according to company standards based on voltage, rating and application
D-12.04.03	visually inspect lightning arrestor for defects such as damaged components and cracks
D-12.04.04	mount and connect lightning arrestor according to company standards and manufacturers' specifications

Task 13 Installs metering equipment.

Context Metering equipment is used to measure customer electrical consumption for billing purposes.

Required Knowledge

K 1	components such as potential transformers and current transformers
K 2	types and ratings of primary meters
K 3	types of secondary meters such as single-phase, three-phase and smart meters
K 4	voltage and amperage ratings
K 5	transformer type meters
K 6	installation and removal procedures

Sub-task

D-13.01 Installs primary metering equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

D-13.01.01	select and use tools and equipment such as aerial devices, drills and FRP tools (sticks)
D-13.01.02	select primary metering equipment including tank and cabinet according to company standards based on type and rating required
D-13.01.03	mount metering cabinet and connect to metering tank on structure

Sub-task

D-13.02 Installs secondary metering equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

D-13.02.01	select and use tools and equipment such as pliers, screw drivers, multi-meters, Allen keys and meter pullers
D-13.02.02	select secondary metering equipment according to company standards based on type and rating required
D-13.02.03	perform meter box safety checks to identify problems such as damaged panel, broken porcelain and loose connection
D-13.02.04	perform meter base test such as voltage check, load check and continuity to the source check
D-13.02.05	place meter into meter socket base
D-13.02.06	secure meter to base with ring and attach seal
D-13.02.07	record meter reading

Task 14 — Installs communication equipment.

Context Powerline technicians install cellular antennas and transfer communications lines between structures.

Required Knowledge

K 1	weights and tensions of cables
K 2	jurisdictional and manufacturers' specifications
K 3	installation procedures

Sub-task

D-14.01 Installs cellular antennas. (NOT COMMON CORE)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
no	yes	no	no	ND	yes	no	no	yes	yes	no	NV	NV

Key Competencies

D-14.01.01	select and use tools and equipment such as drills, wrenches and rigging equipment
D-14.01.02	mount and secure cellular antennas according to company standards and manufacturers' specifications
D-14.01.03	run fibre and power cable from the antenna to the ground and attach to the structure according to company standards and manufacturers' specifications

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Sub-task

D-14.02 Transfers communication lines.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	ND	yes	no	yes	yes	yes	no	NV	NV

Key Competencies

D-14.02.01	select tools and equipment such as drills, wrenches and rigging equipment
D-14.02.02	unbolt clamps from structure
D-14.02.03	transfer cable to new structure

D-14.02.04	re-attach clamps to secure cable according to company standards
D-14.02.05	identify and mitigate hazards associated with fibre cable

BLOCK E OPERATION, MAINTENANCE AND REPAIR

Trends

The occupation is experiencing a move to greater emphasis on live-line maintenance to help prevent outages.

There is an increase in the use of technology based equipment such as digital reclosers, robotic devices and computers in trucks which facilitate more reliable and efficient operation, maintenance and repair of systems.

To aid with troubleshooting, fault indicators and smart meters are used more often.

Related Components (including, but not limited to)

Poles (wood, steel, aluminium, fibreglass, concrete, laminate), primary and secondary conductors, insulation, disconnects, reclosers and other line protection, transformers.

Tools and Equipment

See Appendix A.

Task 15 Operates distribution and transmission systems.

Context

Distribution and transmission systems deliver electricity to customers. By operating a system, powerline technicians change its configuration to isolate sections, transfer loads and to allow for repairs, installation or upgrades. This ensures system reliability and reduces customer outage time.

Required Knowledge

K 1	types of structures, systems and operating voltages
K 2	impact on transmission and distribution systems such as overloading, outages and power quality
K 3	jurisdictional and company regulations regarding system authority and switching orders
K 4	types of overhead and underground transmission and distribution equipment
K 5	load breaking capabilities and methods
K 6	types of inline schematics (single line diagrams) and symbols for stations, and transmission and distribution systems

Sub-task

E-15.01 Operates overhead and underground transmission systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

E-15.01.01	select and use tools and equipment such as FRP tools (sticks), grounds and rubber gloves
E-15.01.02	identify circuits on-site to avoid switching errors and to ensure that work is being performed at correct location
E-15.01.03	operate equipment and devices such as switches according to switching orders from system authority
E-15.01.04	test, commission and energize new transmission systems according to jurisdictional regulations
E-15.01.05	confirm completion of operation to system authority
E-15.01.06	visually inspect and test completion of operation steps

Sub-task

E-15.02 Operates overhead and underground distribution systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

E-15.02.01	select and use tools and equipment such as rubber gloves, load break tools, FRP tools (sticks), grounds and voltage indicators
E-15.02.02	identify circuits on-site to avoid switching errors and to ensure that work is being performed at correct location
E-15.02.03	operate equipment such as switches, tie points, reclosers, elbows, capacitors and regulators according to switching orders and work procedures
E-15.02.04	change circuit status by switching according to order given by system authority
E-15.02.05	test, commission and energize new distribution systems according to jurisdictional regulations
E-15.02.06	confirm completion of operation to system authority
E-15.02.07	visually inspect and test completion of operation steps

Sub-task

E-15.03 Performs station switching.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

E-15.03.01	select and use tools and equipment such as rubber gloves, FRP tools (sticks) and grounds
E-15.03.02	identify circuits to avoid switching errors and to ensure that work is being performed on correct switching apparatus
E-15.03.03	change circuit status by switching according to order given by system authority
E-15.03.04	perform switch and lock-out procedures according to system authority policy
E-15.03.05	confirm completion of operation to system authority
E-15.03.06	visually inspect and test completion of operation steps

Task 16 Maintains distribution and transmission systems.

Context Routine inspection and maintenance are done on these systems to detect, repair and prevent deficiencies before they affect system reliability.

Required Knowledge

K 1	distribution and transmission standards
K 2	inspection procedures
K 3	pole and steel structure maintenance programs
K 4	problems identified during inspection
K 5	company-specific standards and procedures
K 6	system components such as transformers, reclosers, regulators, switches and fuses
K 7	right-of-ways and easements
K 8	safe limits of approach and safe work procedures
K 9	different types of trees and corresponding handling methods

K 10	tree diseases and infestations and disposal procedures of tree trimmings
K 11	types of poles such as concrete, fibreglass, laminate and wood

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Sub-task

E-16.01 Inspects distribution and transmission systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

E-16.01.01	visually inspect poles, structures, footings and apparatus such as transformers, disconnects and capacitors to maintain system's integrity
E-16.01.02	select and use test equipment such as a infrared and thermal equipment, and core samplers
E-16.01.03	recognize deficiencies such as loose connections, broken insulators and grounds
E-16.01.04	perform load checks to identify imbalanced and overloaded circuits
E-16.01.05	report findings of inspection to prioritize repair

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Sub-task

E-16.02 Maintains poles.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

E-16.02.01	stub poles to stabilize and extend life
E-16.02.02	top and cap poles to extend life
E-16.02.03	straighten poles by using equipment such as RBD, chain hoists and plumb bob
E-16.02.04	remove and replace poles depending on conditions such as rotten, infested, fallen and damaged poles, and according to pole type
E-16.02.05	insert pole top extensions or replace for roadway clearances
E-16.02.06	document completed maintenance work according to company policy

Sub-task

E-16.03 Maintains steel structures.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

E-16.03.01	paint towers to prevent rusting and for aerial visibility
E-16.03.02	tighten hardware and change steel bracing to ensure structural integrity
E-16.03.03	repair concrete and wrap footings to ensure structural integrity
E-16.03.04	select and use tools and equipment such as torque and spud wrenches
E-16.03.05	document completed maintenance work according to company policies

Sub-task

E-16.04 Maintains system components.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

E-16.04.01	select and use tools and equipment such as rubber gloves, test equipment, and live-line and hand tools
E-16.04.02	replace system components such as insulators, transformers and guy wires according to jurisdictional requirements
E-16.04.03	replace pole grounds and mouldings
E-16.04.04	remove contaminants from contacts of disconnect switches and insulators to ensure safe operation
E-16.04.05	manually operate equipment and apparatus periodically to ensure safe operation according to jurisdictional requirements
E-16.04.06	document completed maintenance work according to company policies

Sub-task

E-16.05 Trims trees.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

E-16.05.01	select and use tools and equipment such as chainsaws, pruning saws, manlifts and chippers
E-16.05.02	identify hazards of trimming trees such as limits of approach, public safety and step and touch potential
E-16.05.03	follow forestry cutting procedures to ensure safe felling
E-16.05.04	avoid cross-contamination by cleaning equipment and disposing of trimmings
E-16.05.05	remove debris according to jurisdictional requirements
E-16.05.06	document completed maintenance work according to company policies

Task 17 Repairs distribution systems.

Context

Powerline technicians troubleshoot and repair distribution systems to restore power to customers and maintain system reliability. Repairs on distribution systems can be performed on either energized or de-energized lines. Depending on the status, the repair procedures and accompanying considerations will vary.

Required Knowledge

K 1	types of systems and operating voltages
K 2	line diagrams, maps and circuitry
K 3	troubleshooting and repair methods
K 4	fault indicators
K 5	overhead distribution system apparatus such as regulators and reclosers
K 6	overhead distribution system standards
K 7	energized and de-energized work methods
K 8	access points such as vaults, open trenches and manholes
K 9	underground distribution system apparatus such as transformers, switching cubicles and junction boxes

K 10	company-specific standards and jurisdictional requirements
K 11	cable locating and fault detecting equipment
K 12	co-existing underground utilities
K 13	types and sizes of conductors and cables

Sub-task

E-17.01 Troubleshoots overhead distribution systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

E-17.01.01	patrol circuit to identify obvious damage such as fallen trees, damaged poles and downed lines
E-17.01.02	select and use test equipment such as potential indicators, fault indicators and voltmeters
E-17.01.03	sectionalize circuit to determine location of fault
E-17.01.04	isolate fault, damage or hazard and restore power to customers using equipment such as switches and jumpers
E-17.01.05	document switching procedures
E-17.01.06	report trouble and required actions such as repairs or replacements, and estimated repair time to system authority

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Sub-task

E-17.02 Troubleshoots underground distribution systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

E-17.02.01	patrol circuit to identify obvious damage such as damaged poles, transformers and switching kiosks
E-17.02.02	select and use test equipment such as potential indicators, fault indicators, hi-pot testers and voltmeters
E-17.02.03	sectionalize circuit to determine location of fault

E-17.02.04	isolate fault, damage or hazard and restore power to customers using equipment such as switches and elbows
E-17.02.05	document switching procedures
E-17.02.06	report trouble and required actions such as repairs or replacements, and estimated repair time to system authority

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Sub-task

E-17.03 Repairs overhead distribution systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

E-17.03.01	select and use tools, equipment such as rubber gloves, grounds and potential indicators
E-17.03.02	follow safe work procedures such as grounding and bonding
E-17.03.03	remove objects such as trees and obstructions in order to access lines
E-17.03.04	replace components such as transformers, disconnects, conductors, poles and insulators
E-17.03.05	repair conductor by splicing
E-17.03.06	restore system to normal operating status by using switching procedures
E-17.03.07	report completed repairs or replacement of components and restoration of system to system authority

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Sub-task

E-17.04 Repairs underground distribution systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

E-17.04.01	select and use tools and equipment such as rubber gloves, grounds and potential indicators
E-17.04.02	test equipment and cables using tools such as hi-pot testers, meggers and voltmeters to verify fault and integrity

E-17.04.03	expose faulted cables using methods such as mechanical digging, manual digging and using hydro-vacuums
E-17.04.04	replace components such as transformers, switches, conductors, elbows and terminations
E-17.04.05	repair conductor by splicing
E-17.04.06	follow work procedures such as grounding, bonding and retesting cable
E-17.04.07	restore system to normal operating status by using switching procedures
E-17.04.08	report completed repairs or replacement of components and restoration of system to system authority

Task 18 Repairs transmission systems.

Context Powerline technicians repair transmission systems to restore power to customers and maintain system reliability. Repairs on transmission systems can be performed on either energized or de-energized lines. Depending on the status, the repair procedures and accompanying considerations will vary.

Required Knowledge

K 1	operating voltage of overhead and underground transmission systems
K 2	line diagrams, maps and circuitry
K 3	troubleshooting and repair methods
K 4	underground and overhead transmission system components and standards
K 5	energized and de-energized work methods
K 6	access points (manholes)
K 7	company-specific standards and jurisdictional requirements
K 8	cable locating equipment
K 9	co-existing underground utilities
K 10	types and sizes of conductors and cables
K 11	safety with helicopter work

Sub-task

E-18.01 Troubleshoots overhead transmission systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

E-18.01.01	patrol circuit to identify defective equipment and components, and fault location
E-18.01.02	report trouble and required actions such as repairs or replacements, and estimated repair time to system authority
E-18.01.03	operate equipment and devices such as switches to isolate section of transmission lines according to switching orders from system authority

Sub-task

E-18.02 Troubleshoots underground transmission systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	ND	yes	yes	yes	yes	no	yes	NV	NV

Key Competencies

E-18.02.01	pinpoint faults by selecting and using test equipment such as potential indicators, hi-pot testers and high voltage test units
E-18.02.02	isolate fault, damage or hazard and restore power to customers using equipment such as switches according to switching order from system authority
E-18.02.03	visually recognize defective components such as terminations
E-18.02.04	report trouble and required actions such as repairs or replacements, and estimated repair time to system authority
E-18.02.05	document switching procedures

Sub-task

E-18.03 Repairs overhead transmission systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes	NV	NV

Key Competencies

E-18.03.01	select and use tools and equipment such as ladders, chainsaws, grounds and gin poles
E-18.03.02	follow work methods such as grounding and bonding
E-18.03.03	replace components such as cross arms, conductors, poles and insulators
E-18.03.04	repair conductor by splicing
E-18.03.05	report completed repairs or replacement of components and restoration of system to system authority

Sub-task

E-18.04 Repairs underground transmission systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	ND	yes	yes	yes	yes	no	yes	NV	NV

Key Competencies

E-18.04.01	select and use tools and equipment such as FRP tools (sticks), grounds, potential indicators and rubber gloves
E-18.04.02	follow work methods such as grounding, bonding and retesting cable
E-18.04.03	expose faulted cables using methods such as mechanical digging, manual digging and using hydro-vacuums
E-18.04.04	repair conductor by splicing
E-18.04.05	replace faulted terminations
E-18.04.06	report completed repairs or replacement of components and restoration of system to system authority

APPENDICES

APPENDIX A — TOOLS AND EQUIPMENT

Hand Tools

Allen keys
banding tools
bolt cutters
brace and bits
brushing rakes
cable cutters
cant hooks (peavey)
channel lock pliers
chisels
compression tools (M-D6, Y-35, Y-45, Y-46, etc.)
crow bars
digging bars
digging spades
drill bits
files
flashlights
folding tape measures
fuse pullers
hammers
knives
levels
nut drivers
picks
pliers
plumb bob
saws (hand, buck, hack)
screwdrivers
shovels
vice grips
vices
wire cutters
wrenches (adjustable, torque, spud)

Climbing Gear

climbing belts
pole climbers
pole strap/fall restraint devices
tower strap

Personal Protective Equipment

conductive clothing
face shields
fall restraint devices
flame retardant clothing (FRC)
flash glasses/shields
goggles
hard hats
harness/lanyard "fall arrest"
hearing protection
insulated gloves
leather gloves
rubber gloves/sleeves
safety footwear
safety glasses
safety vest/high visibility clothing or apparel
worker positioning systems

Safety Equipment

arrow boards
barricades
breathing protection
bucket escape and descent equipment
burn kits
caution tapes
cones
confined space retrieval equipment
defibrillators
explosive gas, toxic gas and oxygen detectors
fire blankets
fire extinguishers
first-aid kits
flares
grounding devices
meter pullers
rescue and descent equipment
traffic control signage
wheel chocks

Live-Line Tools

auxiliary arm and accessories
bypass jumpers
cut-out covers
FRP tools (sticks)
hard covers (plastic line guards, plastic pole guards, insulator guards, cut-out guards)
insulated web hoists
insulator supports
link sticks
live-line riders
load break tools
load pick-up tools
rubber protective cover-ups (hoses, hoods, blankets)

Electrical Measuring Equipment

continuity testers
current leakage meters
digital recording ammeters
digital recording voltmeters
energized insulator testers
fault indicators
hi-pot testers
meggers
ohmmeters
phasing sticks
potential indicators
phase rotation meters
time domain reflectometers (TDR)

Power Tools

chain saws
cutters (cable, bolt)
drills
impact guns
jack hammers
portable generators
presses (Y-35, Y-45)
saws (circular, chain, reciprocating, chop)
tampers

Specialty Tools and Equipment

air compressors
binoculars
cable identification telephone
cable locators / underground fault locators
cable strippers
collapsible reels
core sampling tools
dynamometers
feed-through devices
field lashing tools
gaff gauges
global positioning systems (GPS)
ground rod drivers
hydro vacuum excavators
infrared cameras
infrared heat guns
magnetic drills
oil sample test kits
propane torches
pulling equipment
range finders
reel jacks
running grounds
sag boards
silicon cloths
spot lights
tension stringing equipment
tool buckets/tool boards

Powder-Actuated Tools

thermal welding tools
powder-actuated connection tools
powder-actuated nail guns
powder-actuated spiking tools
powder-actuated splicing tools

Aerial Work Platforms

bucket trucks
crane with work platforms
fibreglass ladders
insulated pole platforms (diving board)
Material Handling Aerial Device (MHAD)
radial boom derricks (RBD) with bucket attachment

Rigging, Hoisting and Lifting Equipment

block and tackle
capstan hoists
grips
rope
hoists (chain, nylon, cable)
nylon straps
pike poles
pole jacks (pullers)
power reel trailers
shackles
slings
tension machines
wire mesh grips

Off-Road Equipment

all-terrain track machines
all-terrain vehicles
back hoes
boats
bulldozers
excavators
helicopters
skid steers
skidders
snowmobiles
trenchers

Communications Equipment

cellular phones
computers
fax machines
pagers
printers
satellite phones
telephones
two-way radios

APPENDIX B GLOSSARY

bonding	making a mechanically secure electrical connection between two or more objects to ensure they are at the same potential
capacitor	device that improves power quality
cascade lighting	method of switching street lights in the first circuit, which, upon being energized, activates a relay that, in turn, energizes the second; the second then energizes the third, and so on
conductor	that part of a cable, overhead line or apparatus intended to conduct the flow of electrical energy
counterpoise	method of bonding transmission towers, either to ground or to each other
cribbing	method of increasing pole stability in poor soil conditions
de-energized	where electrical energy has been discharged through a mechanically secure connection to an effective ground potential
distribution system	operating system which deliver energy from substation to customers and generally operates between 2400 volts to 34,500 volts
energized	capable of delivering energy by reason of being dynamically alive or charged
fault indicators	device which indicates a defect or abnormal condition in a conductor
fibreglass reinforced plastic (FRP) tool	insulated live-line tools; also known as hot stick
footing	concrete or grillage support for a structure; the base
grillage	buried portion of a steel tower acting as a footing
grounding	placing interconnected parts at ground/earth potential
guy wires	high tensile steel wire attached to an anchor point which is installed to offset a conductor tension and equipment load
hydro-vacuum excavation	excavating with high-pressure water and a vacuum system
isolated	physically disconnected or separated from all sources of dynamic energy
laminate poles	poles made of laminated wood
lock-out and tag-out	procedure to prevent unauthorised operation of equipment

maintenance programs	preventative or pro-active programs to ensure reliability of system
meggering	to apply potential to test electrical equipment for continuity and insulation
metering equipment	equipment used to track customer consumption of electricity for billing purposes
network systems	connecting points of generation or supply sources
nomenclature	powerlines and electrical apparatus designated by alphabetic and numeric codes
ping	deformation of threads to prevent nuts from loosening due to vibration
potential	latent energy (potential presence of voltage)
powder-actuated tools	tools that requires an explosive charge to operate
primary	voltage above 751 volts alternating current (distribution system)
reactor	equipment that stabilizes over-voltage conditions
secondary	voltage 750 volts alternating current, and below (distribution system)
sectionalize	to isolate or separate sections of line
splicing	the joining of two conductors together end to end
standards	local or utility-based structural designs
structure	a device used to support conductors or cables and related equipment; for example, poles and towers
switching	an operation that affects or modifies the status of a system
transmission line	operating voltage over 35,000 volts
transmission system	operating system with a voltage between 138,000 volts to 765,000 volts

APPENDIX C ACRONYMS

ACSR	aluminium conductor steel reinforced
CCA	chromated copper arsenates
FRC	flame retardant clothing
FRP	fibreglass reinforced plastic
GIS	Geographical Information System
GPS	Global Positioning System
kVA	kilovolt/ampere
LED	light emitting diode
OH&S	Occupational Health and Safety
PPE	personal protective equipment
RBD	radial boom derricks
SF6	sulphur hexafluoride gas
TDG	Transportation of Dangerous Goods
ULF	Ultra low frequency
VLF	Very low frequency
WHMIS	Workplace Hazardous Materials Information System
WLL	working load limit

APPENDIX D — BLOCK AND TASK WEIGHTING

BLOCK A COMMON OCCUPATIONAL SKILLS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	30	15	10	17	ND	10	30	20	25	30	24	NV	NV	21%

Task 1 Uses and maintains tools and equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	30	20	20	23	ND	10	10	25	30	25	22	NV	NV	21%

Task 2 Accesses work area.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	10	20	20	15	ND	15	20	15	20	15	15	NV	NV	17%

Task 3 Organizes work.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	20	20	20	14	ND	15	10	15	10	20	14	NV	NV	16%

Task 4 Establishes safe work environment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	10	20	20	19	ND	30	30	25	20	20	19	NV	NV	21%

Task 5 Uses live-line methods.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	30	20	20	29	ND	30	30	20	20	20	30	NV	NV	25%

BLOCK B STRUCTURES

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	10	15	10	13	ND	18	5	15	15	12	12	NV	NV	13%

Task 6 Installs poles.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	50	60	100	92	ND	70	70	80	80	80	100	NV	NV	78%

Task 7 Installs steel structures.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	50	40	0	8	ND	30	30	20	20	20	0	NV	NV	22%

BLOCK C CONDUCTOR SYSTEMS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	10	20	25	12	ND	18	15	20	15	12	20	NV	NV	17%

Task 8 Installs overhead conductors.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	70	60	80	71	ND	60	55	50	50	60	58	NV	NV	61%

Task 9 Installs underground and underwater cable.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	30	40	20	29	ND	40	45	50	50	40	42	NV	NV	39%

BLOCK D AUXILIARY EQUIPMENT

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	15	25	30	24	ND	25	25	20	15	22	17	NV	NV	22%

Task 10 Installs lighting systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	10	15	10	13	ND	10	15	8	10	5	22	NV	NV	12%

Task 11 Installs voltage control equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	30	25	40	38	ND	35	40	38	40	40	33	NV	NV	36%

Task 12 Installs protection equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	30	30	40	31	ND	35	30	32	30	40	33	NV	NV	33%

Task 13 Installs metering equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	25	20	10	14	ND	20	15	20	15	10	12	NV	NV	16%

Task 14 Installs communication equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	5	10	0	4	ND	0	0	2	5	5	0	NV	NV	3%

BLOCK E OPERATION, MAINTENANCE AND REPAIR

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	35	25	25	34	ND	24	25	25	30	24	27	NV	NV	27%

Task 15 Operates distribution and transmission systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	15	20	25	29	ND	20	30	35	30	30	34	NV	NV	27%

Task 16 Maintains distribution and transmission systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	15	20	25	28	ND	30	20	15	30	20	31	NV	NV	23%

Task 17 Repairs distribution systems.

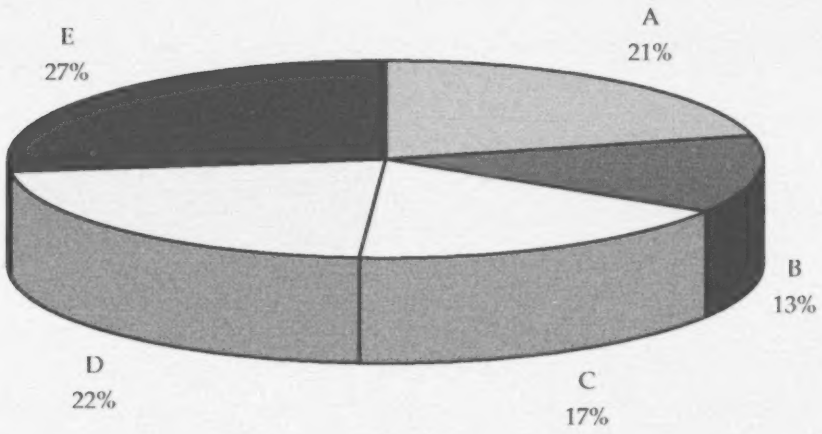
	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	35	30	40	34	ND	40	40	35	30	40	19	NV	NV	34%

Task 18 Repairs transmission systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	35	30	10	9	ND	10	10	15	10	10	16	NV	NV	16%

APPENDIX E

PIE CHART*



TITLES OF BLOCKS

BLOCK A	Common Occupational Skills	BLOCK D	Auxiliary Equipment
BLOCK B	Structures	BLOCK E	Operation, Maintenance and Repair
BLOCK C	Conductor Systems		

*Average percentage of the total number of questions on an interprovincial examination, assigned to assess each block of the analysis, as derived from the collective input from workers within the occupation from all areas of Canada. Interprovincial examinations typically have from 100 to 150 multiple-choice questions.

APPENDIX F

TASK PROFILE CHART — Powerline Technician

BLOCKS	TASKS	SUB-TASKS			
A – COMMON OCCUPATIONAL SKILLS	1. Uses and maintains tools and equipment.	1.01 Maintains hand, power and powder-actuated tools and equipment.	1.02 Maintains electrical measuring and testing equipment.	1.03 Uses rigging, hoisting and lifting equipment.	1.04 Uses personal protective equipment (PPE) and safety equipment.
	2. Accesses work area.	2.01 Climbs poles and structures.	2.02 Uses access equipment.	2.03 Uses on- and off-road equipment.	
	3. Organizes work.	3.01 Interpret codes, regulations and procedures.	3.02 Interprets plans, drawings and specifications.	3.03 Prepares worksite.	3.04 Plans job task and procedures.
	4. Establishes safe work environment.	4.01 Controls powerline hazards.	4.02 Controls environmental hazards.	4.03 Performs lock-out and tag-out procedures.	
	5. Uses live-line methods.	5.01 Uses cover-up.	5.02 Uses rubber gloves.	5.03 Uses bare-hand methods.	5.04 Uses fibreglass reinforced plastic (FRP) tools (sticks).
B - STRUCTURES	6. Installs poles.	6.01 Frames poles.	6.02 Sets poles.	6.03 Installs pole guys and anchors.	
	7. Installs steel structures.	7.01 Installs footings. (NOT COMMON CORE)	7.02 Assembles steel structures.	7.03 Erects steel structures.	7.04 Installs steel structure guy wires and anchors.

BLOCKS	TASKS	SUB-TASKS				
C – CONDUCTOR SYSTEMS	8. Installs overhead conductors.	8.01 Strings overhead conductors.	8.02 Sags overhead conductors.	8.03 Ties-in overhead conductors.	8.04 Splices overhead conductors.	
	9. Installs underground and underwater cable.	9.01 Installs conduit and cable installations.	9.02 Places underground and underwater cable.	9.03 Splices underground and underwater cable.	9.04 Terminates underground and underwater cable.	
D – AUXILIARY EQUIPMENT	10. Installs lighting systems.	10.01 Installs street lights.	10.02 Maintains street lights.			
	11. Installs voltage control equipment.	11.01 Installs transformers.	11.02 Installs capacitors.	11.03 Installs voltage regulators.	11.04 Installs switches.	11.05 Installs reactors. (NOT COMMON CORE)
	12. Installs protection equipment.	12.01 Installs reclosers.	12.02 Installs sectionalizers.	12.03 Installs fuses.	12.04 Installs lightning arrestors.	
	13. Installs metering equipment.	13.01 Installs primary metering equipment.	13.02 Installs secondary metering equipment.			
	14. Installs communication equipment.	14.01 Installs cellular antennas. (NOT COMMON CORE)	14.02 Transfers communication lines.			

BLOCKS	TASKS	SUB-TASKS				
E – OPERATION, MAINTENANCE AND REPAIR	15. Operates distribution and transmission systems.	15.01 Operates overhead and underground transmission systems.	15.02 Operates overhead and underground distribution systems.	15.03 Performs station switching.		
	16. Maintains distribution and transmission systems.	16.01 Inspects distribution and transmission systems.	16.02 Maintains poles.	16.03 Maintains steel structures.	16.04 Maintains system components.	16.05 Trims trees.
	17. Repairs distribution systems.	17.01 Troubleshoots overhead distribution systems.	17.02 Troubleshoots underground distribution systems.	17.03 Repairs overhead distribution systems.	17.04 Repairs underground distribution systems.	
	18. Repairs transmission systems.	18.01 Troubleshoots overhead transmission systems.	18.02 Troubleshoots underground transmission systems.	18.03 Repairs overhead transmission systems.	18.04 Repairs underground transmission systems.	